

Site: A.L. Taylor
Break: 2.8
Other: _____

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VALLEY OF THE DRUMS
Shepherdsville, Kentucky

DRAFT

Spring 1979

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ACKNOWLEDGEMENT

This report would not be possible without the cooperative efforts of numerous individuals associated with Region IV's Emergency Response Branch, Water Surveillance Branch, Technical Support Branch and Ecology Branch plus the Environmental Response Team and the Kentucky Division of Water Resources.

A.L. TAYLOR DUMP SITE
(VALLEY OF THE DRUMS)

INTRODUCTION

On March 2, 1979, Region IV activated the Revolving Fund to clean up a spill from the Valley of the Drums in Bullit County, Kentucky. Jack Stonebreaker assumed the role of OSC and directed the contractor, OH Materials, EPA's Environmental Response Team, Coast Guard's Gulf and Pacific Strike Team, the Coast Guard's PIA Team, U.S. Fish and Wildlife and the State of Kentucky in a coordinated effort to contain and mitigate the environmental emergency at the Valley of the Drums.

The dump was opened around 1961 and operated by Mr. A.L. Taylor. In 1977, the dump was closed and Mr. Taylor died in early 1978. During the operation of the facility, Mr. Taylor never obtained a permit.

Records obtained from industrial firms contrast from records obtained from the Taylor Company. Taylor's records are incomplete especially regarding a period of heavy activity during 1975 and 1976.

Industrial records indicate a total of 27,389 drums were delivered to the site while Taylor's records show only 7,339 being delivered to the site. Industries that have provided the state with records are: Reliance Universal, Inc. (13,301); Ford Motor Company (10,105); George W. Whitesides Company (3,082); Kurfees Coating (489); Tremco (200); C&C Supply (98); Guardsman Chemical (67); Louisville Varnish (33); and Randal VeVay (14).

Assuming the total of 27,389 drums and the above ground count of 16,383 drums, the remaining 11,006 drums would approximate the number of buried drums on site. This number, however, is based on records from selected industries and would not indicate drums from other sources.

ENVIRONMENTAL INVESTIGATION

A series of field sampling efforts were conducted by EPA and State of Kentucky Water Resources personnel to document the occurrence and extent of contamination in the surface water and soils on the site proper and adjacent receiving waters. The initial sampling was performed to determine oil and grease, the presence of which in the adjacent waters was justification for the use of 311(k) funds for mitigation and cleanup.

EPA/REGION IV AND ERT SAMPLING EFFORTS

The first environmental samples in connection with the A.L. Taylor Site (Valley of the Drums) was collected by Region IV Surveillance and Analysis personnel on February 13, 1979 (~~February 13, 1979~~). On this date, water and sediment samples were collected from Wilson Creek at sites downstream from Valley. This was part of a larger sampling effort that was being performed in connection with other hazardous waste disposal sites in and around the Louisville area that were being investigated.

In the latter part of February (February 22), site specific sampling was performed on the A.L. Taylor site to delineate the types and quantities of hazardous materials present. *(see Figure 1 in Appendix)* At this time, water samples were collected from standing water pools and melt water running off the properties of Wilson Creek. Also, sediment samples were collected at specific sites to determine the presence of contamination in the surface soils.

In early March, during the early stages of cleanup, water and soil samples were collected by John Gilbert, EPA-ERT and Environmental Consultants, Inc., under contract to EPA. These samples were collected from specific areas within the A.L. Taylor properties and downstream in Wilson Creek.

On March 7th, an in-situ examination of Wilson Creek, the remote stream immediately adjacent to the Valley, were conducted by Don Schultz, Region IV Biologist and Royal J. Nadeau, ERT Biologist at the request of the OSC to perform an assessment of the biological and ecological state of the

stream (see ~~attachment map~~ ^{Figure 2} in Appendix).

This assessment was performed by sampling and examining the benthic infauna of Wilson Creek. A small dip net (approximately 20 mm in diameter flattened on one side) was used to sample the infaunal community at various locations in the upper reaches of Wilson Creek. Most of the stations were downstream from the Valley of the Drums, with one being on a tributary (Station 2 Control).

Station 1 is located just below the bridge crossing the National Turnpike. The stream bottom is comprised of bricks, concrete chunks and other types of solid rubble that is often times prevalent in streams that are associated with human population centers. We sampled the bottom by holding the dip net downstream, as we over-turned some of the in-stream objects. Also, we probed the vegetation overhanging in the stream to dislodge any epifauna present.

Station 2, which we considered as a control station, was located on an unnamed tributary to Wilson Creek, which drains the easterly slope of the South Park Hills, which are part of the County park systems. We sampled a small segment of the stream just upstream from the bridge on South Park Road and Hornback Road.

Station 3 was located on Wilson Creek approximately three miles downstream from the Valley. The creek had eroded a bed 6-8 feet below the level of the flood plain. The bed was composed of construction material rubble and alluvial clay deposits that was riddled with crayfish burrows.

Station 4 was located downstream from the Valley at the boundry of the county forest. Just upstream from this station, was a small dam that had been installed as part of the instream treatment system. Water was being pumped from behind the dam into a fountain manifold that had been installed

upland. The stream water was aerated to release volatile organics then allowed to trickle over the ground surface back to Wilson Creek.

Station 5 was located on a small stream that originated in the golf course located upland from the Valley. The stream was approximately two feet wide and .25 feet deep at this station. The flow as low but constant.

Station 6 was located on a small feeder stream that flowed into Wilson Creek. ~~Station 6 was located on a small stream that flowed into Wilson Creek.~~ approximately .25 miles downstream. This feeder stream was approximately one foot wide and .5 feet deep. The flow was slight and formed ripples and pools as the stream flowed down the hillside.. The stream bottom was composed of sand and gravel, with occasional clumps of allochthonous materials, ~~RAE~~ dead leaves and twigs. This station was considered as another control as it drained a water shed that was within the county forest with little ~~disturbance~~ from man's activities.

STATE OF KENTUCKY SAMPLING

On March 6th, a meeting was held at the Command Post attended by the following:

<u>NAME</u>	<u>AFFILIATION</u>
Robert Ware	Kentucky Div. of Water Quality
Robert Logan	Kentucky Div. of Water Quality
Robert Bay	U.S. Fish and Wildlife Service
Waynon Johnson	U.S. Fish and Wildlife Service
Don Schultz	USEPA— Region IV
John Gilbert	USEPA— ERT
Royal Nadeau	USEPA— ERT

The primary purpose of this meeting was to recommend a sampling survey that would generate the types of environmental information for the OSC, Jack Stonebreaker.

The consensus of the group was:

a. A sampling of Wilson Creek should be performed as soon as possible to determine the extent of impact relative to chemical and biological parameters.

b. That some acute toxicity tests be performed on water collected from specific locations on Wilson Creek and from the "collection pond." The emphasis was not to determine a TL50 so much as to note any ~~toxic effects~~ ^{toxic effects} on the test organisms.

c. That chemical analysis be performed on tissues of aquatic organisms collected from Wilson Creek to determine possible biomass contamination of specific organisms compounds originating on the Valley.

At this meeting the State of Kentucky representatives indicated that they would collect water and biological samples which would then be shipped to Region IV's Athens Laboratory for analyses.

On March 8th, a sampling team consisting of EPA-ERT and State of Kentucky personnel took water and sediment core samples from the same locations as identified for the biological evaluation sampling effort. In addition, water and sediments were collected from an abandoned settling pond within the Valley. Water for bioassays were collected from Station 02, 04 and 08 (collection pit). These samples were then transported to Athens under ice to the Athens Laboratory by Region IV personnel.

On March 9th, benthic organisms (mostly crayfish) and fish (minnows) were collected by State of Kentucky personnel near the same sampling location as previously identified (see Figure 3). These organisms were shipped to Athens under ice for chemical analysis of their tissues.

On April 16-19, 1979, State of Kentucky personnel collected additional biological specimens for chemical analysis. The samples consisted mainly of fish collected from Wilson Creek and some additional downstream station in Bee Lick Creek, Northern and Southern Ditch, and Pond Creek. The fish were collected via electroshocking and hoop nets, then sent on ice to Athens for chemical analysis.

ANALYTICAL METHODOLOGY

Upon receipt by EPA Region IV Surveillance and Analysis Division's Laboratory, the samples were processed and analyzed according to acceptable analytical procedures.

WATER

Water samples were analyzed by a modified procedure which has been devised for Priority Pollutants (revised April 1977).

SEDIMENT

The sediment samples were first processed in a high speed mechanical ~~dispenser~~ and ~~separator~~ ^{down} to break ~~up~~ the large soil chunks to a uniform sediment particle size. These ~~homogenates~~ were extracted with acetone/hexane at a 1:1 mixture, then analyzed in a Gas Chromatograph/ Mass Spectrograph.

TISSUE

Tissue analyses were performed at the University of Georgia under contract to EPA-Region IV.

Sample cleanup was accomplished through an automated cleanup device ~~which~~ which utilized ³ gel permeation. This procedure separates and sorts according to molecule size. Extraction was according to the FDA Pesticide Analytical Method as modified to accomodate the gel permeation cleanup technique.

RESULTS AND ~~DISCUSSION~~ DISCUSSION

The extensive environmental sampling and analytical effort revealed the presence of a vast array of inorganic and organic substances in the Valley proper and the adjacent Wilson Creek.

The substances of main concern for this report are the organics, as it is these compounds that information is most scarce. Therefore, more attention will be directed to these substances than the inorganic constituents, ~~_____~~

A.L. TAYLOR SITE

The results of the February sampling are reported in Table ¹/₂. A total of 126 organic compounds were identified as being present in the water running off the site or collected in small puddles. Station AT-5 had the largest assortment of compounds. Station AT-1 and 2 had the least number. Station AT-5 was a large pool of standing water in a small depression from snow melt running off the upper slopes which contained a large number of drums lying on the surface. Subsequent excavation revealed ^{an} undetermined number of drums buried in this same area.

Station AT-7 was a settling impoundment which had been constructed by Mr. Taylor to hold wastes emptied from drums that were ~~sub~~ returned on the upland slope of the pond. These analyses revealed a large number of solvents, ketones, phthalates and other organic compounds which are used or associated with paint and plastic industries.

The results of the sediment analyses revealed fewer number of organic compounds than the water samples collected from the same area within the Valley. Station AT-4 sediment samples revealed the largest number of compounds (28 distinct identifiable compounds). Aroclor 1254 and 1260 were among the compounds identified from this station along with several solvent type compounds.

WILSON CREEK WATERSHED

The topographical location of the Valley is at the top of the watershed of Wilson Creek. This position also affects the hydrological gradient. The normal stream flow in Wilson Creek adjacent to the Valley is low and subject

~~to fluctuation~~ fluctuation from seasonal storm and melt water contribution. The stream bottom in these upper reaches mainly consists of sand and some clay deposits. These materials are the results of erosion that has carried the materials into the stream from adjacent upland area.

Wilson Creek does not have a USGS gaging station, therefore, there are no historical stream flow data. There is flow in the stream bed throughout the year, although very slight during dry periods.

WATER

The water samples collected on March 8th from Wilson Creek only revealed nine identifiable organic compounds with bis (2-ethyl-hexyl) phthalate occurring at Station 02, 03 04 with station 04 having the largest concentration.

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An independent laboratory (Environmental Consultants) analyzed a water sample collected slightly downstream from the Valley. It contained methyl pentanone, ethyl benzene and xylene in trace amounts.

In another water sample analyzed by the same laboratory on the same day (March 4), xylene compounds were found in trace amounts.

On a separate sampling run performed by the State of Kentucky in
(see Figure 5)
early February, water samples collected just downstream from the Valley contained a vast array of organic compounds (38 identifiable compounds. See Table 2). Many of these were present at all of the station sampled in Wilson Creek. Most of the compounds occurring in the water on this sampling date are ones that are associated with paints and solvents. The water samples from the station closest to the Valley, contained elevated levels of methyl ethyl ketone and methyl isobutyl ketone.

SEDIMENTS

The sediment samples collected by the State of Kentucky in Wilson Creek were contaminated with trace amounts of organic compounds (19 identified compounds). Aroclor 1254 and 1260 were present at all station in Wilson Creek in above trace amounts.

ECOLOGICAL EVALUATIONS

The results of the biological surveys of Wilson Creek proper performed by EPA biologists and State of Kentucky biologists are outlined in Table 3. Only those station that were sampled by both groups are listed. The observations made by each are similiar and tend to collaborate each others results.

Some of the stations sampled by each group were not synonymous. For example, Station 04 through 06 of the EPA biological survey were closer to the Valley while Station 04-08 of the State survey were ~~located~~^{located} downstream outside of Wilson Creek proper. (TABLE 4).

The observations of the EPA survey for these remaining stations are listed in Table .

The populations of aquatic invertebrates living in Wilson Creek belong to those groups of organisms that are usually found in stream through the physical/chemical features. Many of these organism types can occur in streams that have been disturbed by man's activities. Therefore, their presence in streams is not necessarily indicative of stress being applied to aquatic ecosystem by the contaminants emanating from the Valley.

The presence of the macroinvertebrate species observed indicate that toxic compounds occurring in the water and sediments of Wilson Creek are not having a catastrophic deleterious impact on these populations.

More likely, the impact to the biological resource living in Wilson Creek is in the form of sublethal, low level contamination of biomass. This biomass

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contamination is present within a variety of species forming the food web as indicated by the presence of certain organic contaminants, i.e., Aroclor 1254 and 1260 in the fish and macroinvertebrate tissues. It turns out that PCB's may not be the most appropriate organic compounds to show the impact of the Valley on these biological resources as there is not clear pattern to the tissue levels of PCB's that correlates to the location of the Valley relative to the sampling locations. Out of the 126 identifiable organic compounds found in the Valley, many have a potential for bioaccumulation as indicated from the Log P values (Table 5).

Log P is an expression of octanol/water partition coefficients which essentially indicate the solubility of a substance in octanol relative to its solubility in water. It is expressed as a ratio, for example, a Log P, a value of 4.0 indicates that the material is 10,000 times more soluble in octanol than water.

A substance that is soluble in octanol is considered to be potentially soluble in some of the biochemicals and that present in living systems. Once incorporated into living systems, these same materials can interfere with normal physiological functions, accumulate in certain tissues and be passed on through the food web to the next trophic level species.

Published biological concentration factors (BCF) that have been determined for specific organic chemicals, other than halogenated pesticides, are scarce indeed. As a result, the impact of many of these compounds is unknown or not ^{well} understood. This is the case for many of the compounds present in the Valley.

The presence of the abundant population of amphipods and isopods are indicative of allochthonous based food webs, being that these organisms utilize dead leaves and similar organic materials for food. These organisms are then preyed upon by more mobile species as a food source, i.e., fish present. It is not

surprising to find this type of energy flow or food web present in a creek like Wilson Creek which flows through the heavily wooded area near the Valley.

An interesting aspect regarding the fate of contaminants are large molecule organics, with various degrees of water solubility. Those that are rather insoluble are sorbed onto the particulate or suspended matter, i.e., eroded soil particles, dead leaves and bark pieces, etc. Some of these contaminants are deposited in the stream bottoms or in shallow shoal areas. Some are incorporated into the food webs when consumed by the indigenous populations feeding upon the allochthonous materials or bottom deposits.

It so happens that the organic scan performed on the tissues collected were for PCB's and pesticide compounds. **DRAFT** The water analyses did not indicate the presence of halogenated pesticides in the Valley, therefore, it is not surprising that these type compounds were not detected in the organisms analyzed. These same analyses do indicate that there are other compounds, some of which are known toxics, i.e., Priority Pollutants, etc., that are present in the Valley. These are the types of compounds that if incorporated into the biological resouts could seriously affect the utility of these resources. This phenomena has been well documented for Mirex in Lake Ontario and Kepone in the James River. In both cases, the biological resouts affected were determined to be unfit for consumption or any other type of exploitation.

Since the tissue extracts were only analyzed for PCB's and halogenated pesticides, other organic compounds may be present in the tissues, therefore, it may be wise to expose these extracts to GC/MS examination. GC/MS would reveal the presence of other compounds, i.e., PNA's that might be present.

MODE OF CONTAMINATION

The main mechanism of environmental contamination to the aquatic resources is via surface and just below the surface runoff into the Wilson Creek watershed. This was obvious in the initial EPA investigation and actually triggered the activation of a 311(k) cleanup by Region IV.

Surface water containing oils were sighted at this time, however, the underlying, more serious concern related to the numerous potentially toxic compounds that were in the drums.

The discharge of toxic compounds from the Valley is obvious but not easily quantified. Surface runoff is dependent upon rainfall and snowfall. An examination of the Climatological Data Record for the Louisville Weather Office of the National Weather Service located at Standiford Field Airport revealed ~~fluctuation in precipitation~~ ^{precipitation} in amounts and types, for the spring when most of the sampling and mitigation activities were occurring.

The actual area of the Valley containing drums was about 10.1 acres as determined from the USGS Topographic Map (Brooks, Kentucky Quadrangle). The ~~soils~~ ^{soils} in the Valley are relatively impervious, therefore, most of the precipitation falling on these 10 acres will end up as runoff.

The collection pond and collection ditches were designed to entrap most of the runoff emanating from the drums storage area. According to the latest estimates, the effluent flow from the in-place treatment system is approximately 227 liters/min (60 gals/min). The system is operated for ten days out of a month during the summer, thus, the discharge from the Valley for this summer was approximately 327,059.5 liters/day. Negating evaporation from the collection pond, the discharge volume would approximate the amount of water being contributed to Wilson Creek from the Valley, prior to the mitigation procedures, ~~the discharge volume would approximate the amount of water being contributed to Wilson Creek from the Valley, prior to the mitigation procedures.~~

Knowing the discharge rate and the concentrations of materials in this discharge, it is obvious that significant amounts of toxics were being con-

tributed to Wilson Creek from the Valley. For example, Diethyl Phthalate, which is one of the Priority Pollutants, would be discharged from the Valley at the rate of 8.5 grams/day for the summer months; perhaps more for the months when flow would be greater.

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MAN'S USE OF CHEMICALS FOUND IN THE VALLEY

It was difficult, actually impossible, to determine the origin of all the compounds found in the Valley being that records of the origin of the drums were not available. Therefore, we resorted to performing a literature search on each identified compound in hopes of finding its use within our present society. Table 6 represents the results of this effort. The categories listed are the more common uses of organic compounds found in the Valley. As expected, not all the compounds identified could be cataloged, these are indicated by the blank space. **DRAFT** a majority of the 126 compounds found are used as solvents or associated with plastics or paint manufacturing.

The rest are distributed rather evenly throughout the other uses listed.

TOXIC EFFECTS OR ORGANIC EFFECTS FOUND IN THE VALLEY.

When the results of the initial environmental sampling revealed the extent and types of organic compounds in the Valley, a literature search was performed to determine the known effects of these compounds. Table 7 categorizes the effects according to the effects documented in the Registry of Toxic Effects (Fairchild, et al, 1977).

Out of the 142 compounds, 40 are included in the Human Effects section of the Registry of Toxic Effects, 27 are in the Carcinogenic Effects Section, and six are in the Teratogenic¹⁶ Effects Section of the Registry.

In order for a substance to be listed in the Carcinogenic Effects Section, there must be documented evidence that malignant tissues are produced by the substance in the body of the test animal. For a material to be included on the Teratogenic Effects, it must be documented that changes in offspring are produced but are not transmissible^{17,18} to their offspring. Those substances that are listed in the Human Effects have been found to have produced responses that is considered deleterious in some manner by the panel of experts that review and screen these materials.

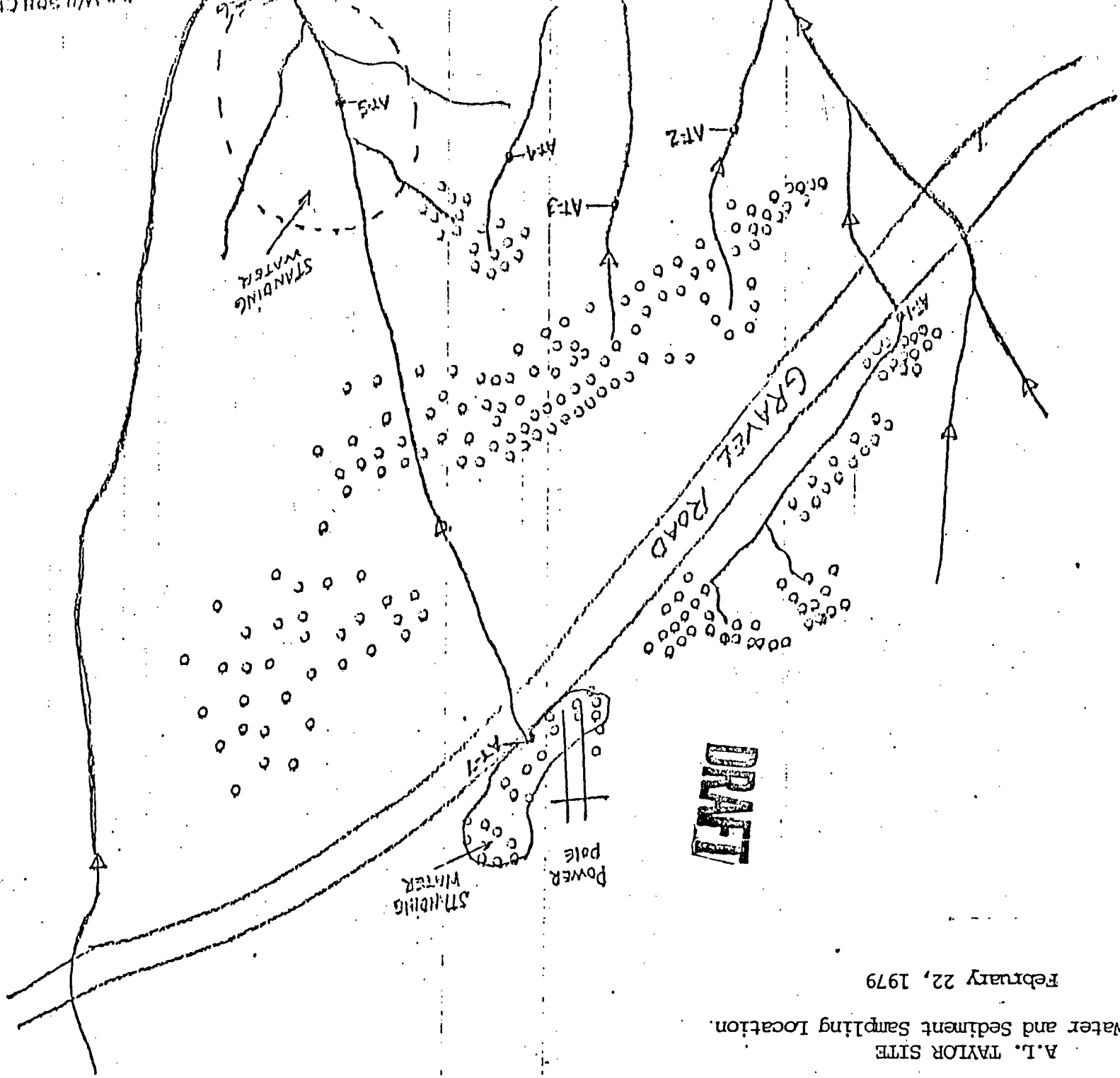
Literature Cited and Data Sources

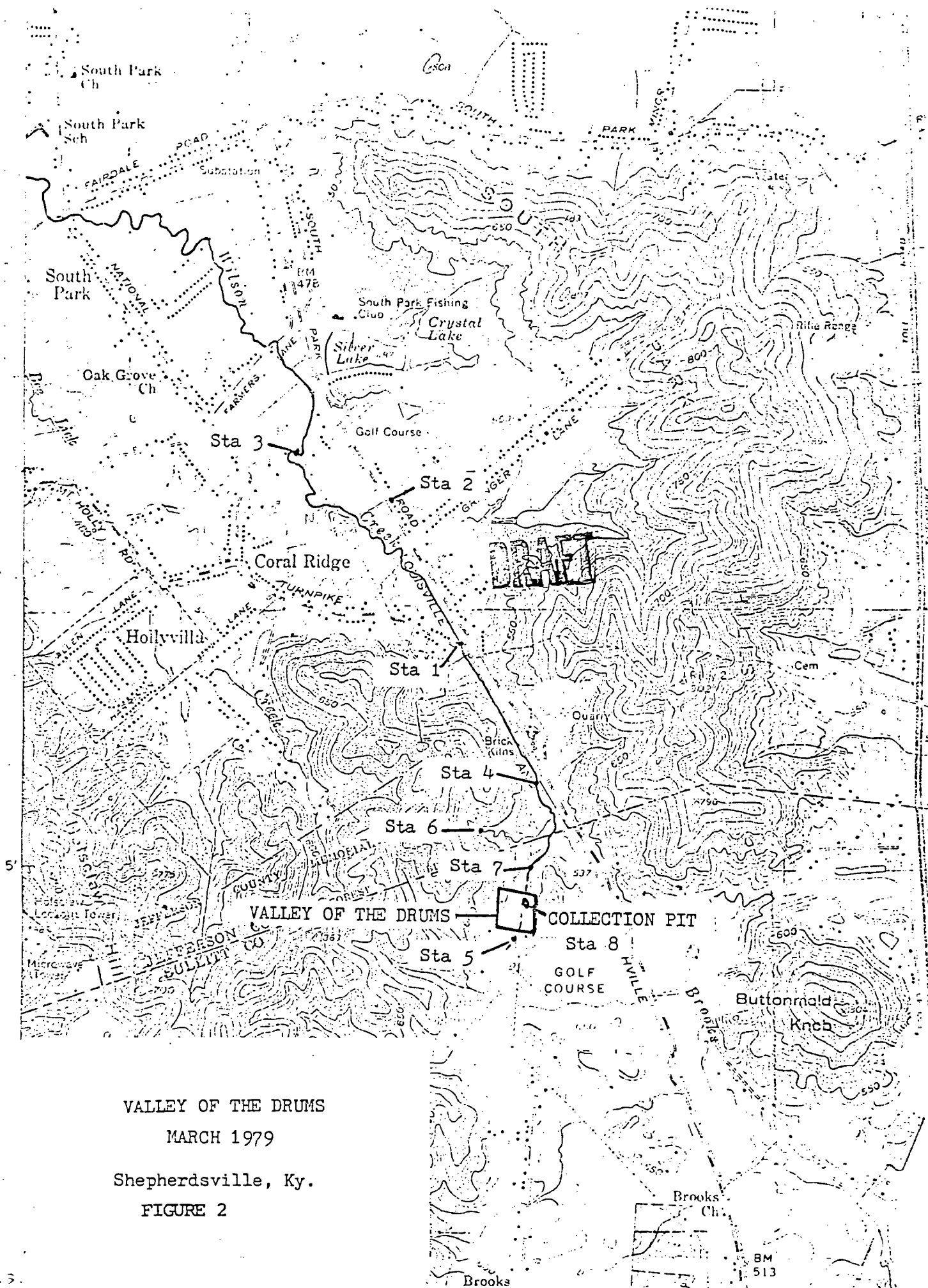
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2. Veith, Gilman D. and R.T. Morris 1978. A rapid Method of estimating Log P for organic chemicals. EPA-600/3-78-049. 16 pgs.
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FIGURE 1

A.L. TAYLOR SITE
Water and Sediment Sampling Location.
February 22, 1979



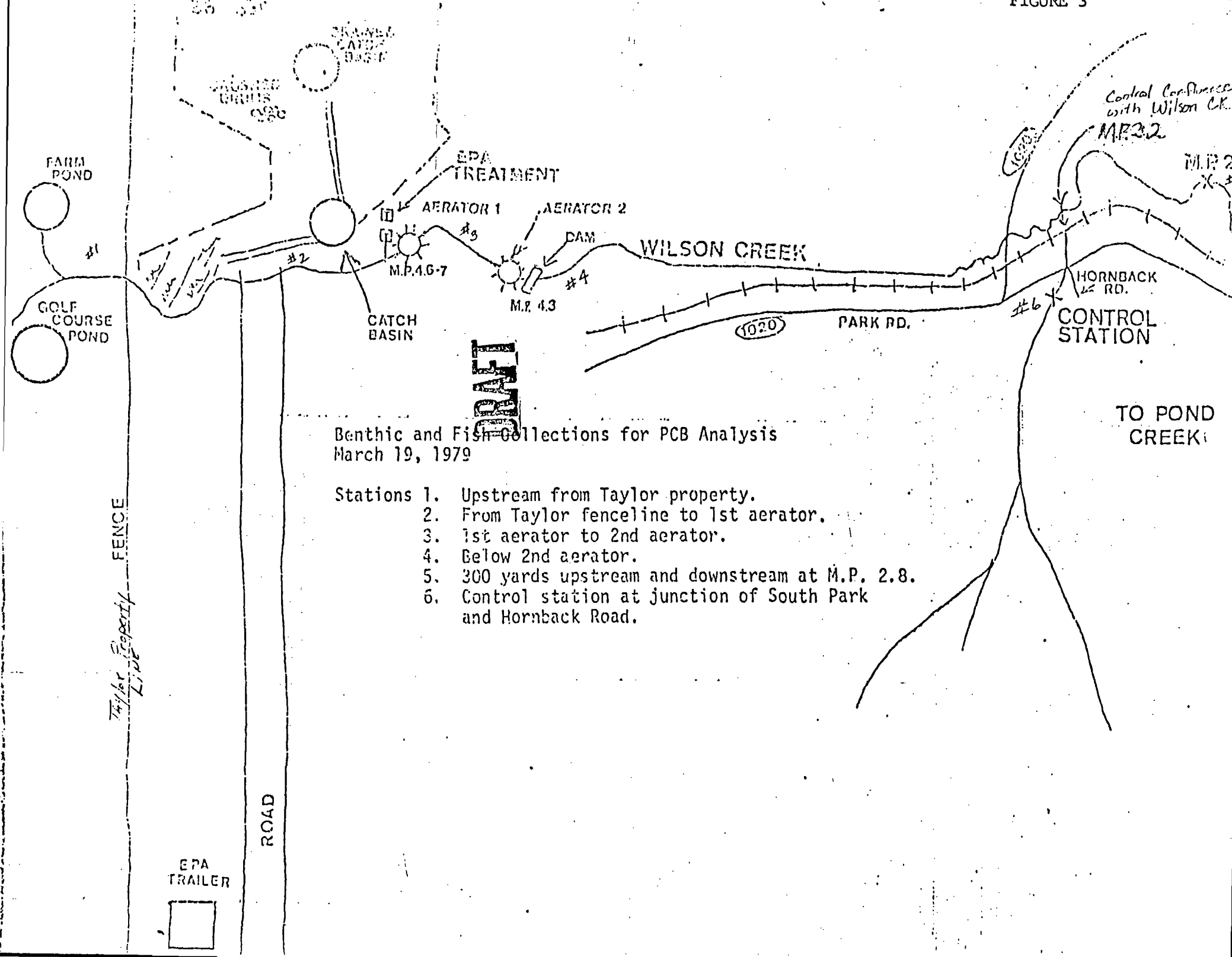


VALLEY OF THE DRUMS

MARCH 1979

Shepherdsville, Ky.

FIGURE 2



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ACKNOWLEDGEMENT

This report would not be possible without the cooperative efforts of numerous individuals associated with Region IV's Emergency Response Branch, Water Surveillance Branch, Technical Support Branch and Ecology Branch plus Environmental Response Team and the Kentucky Division of Water Resources.

TABLE 1

COMPOUND (ppb)	AT-1		AT-2		AT-3		AT-4		AT-5		AT-6		AT-7	
	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT
Benzene					10-100		10-100		1-25		1-10		10-50	
Methyl Benzene (1 isomers)					10-100		10-100		1-25		1-10		10-50	
o-Alkyl Benzene					10-100		1-10		1-25		1-10		1-10	
m-Alkyl Benzene							1-10				1-10		1-10	
p-Alkyl Benzene									1-25				1-10	
Unidentified compounds 1-10 ppb					18		16	37	24		20			
Unidentified compounds 10-100 ppb					11		11	1	12		1			
Xylene (2 isomers)					260		120	330	470		62		320	
Methyl Pentanol													27	
Methyl Cyclopentanol													42	
Methyl Pentanone													27	
Butoxyethanol													73	
Methyl Hydroxy Pentanone					24		170		220		28		200	
o-Alkyl Benzene (1 isomers)					64		21	10-100	72		57		24	
Hexanone									47				66	
Diisobutylmethanol (1 isomers)					65		150		86		15		60	
Methyl Styrene					48								9	
o-Alkyl Benzene (1 isomers)					22		11	10-100	26				28	
1,4-Dimethyl Benzene Methanol					5.6						19		86	
o-Alkyl Benzene					9.7								73	
Methyl Benzene Methanol													23	
Isophorone											15		27	
Phenoxymethyl Ethyl Ether													13	
Phenyl Ether								1-10			64		27	
Chlorophenoxymethyl Ether													18	
Dimethyl Phthalate							8.7		9.6		13		16	
Phenoxymethyl Ether													27	
Tetraoxadecane			220		6.6		20		7.2		2.7		29	
Dimethyl Phthalate	9.4		17		42		4.9		27		26		64	
Methyl Propyl Ester of Benzene					75				17				37	
Acid					27						4.7		9.1	
Pentaoxapentadecane			220		28		4.9		36		7.4		27	
Bis (2-ethylhexyl) Phthalate	10		45					120					10-50	
Methyl Butanoic Acid													1-10	
Pentanoic Acid														
Phenol							741	741	721		741		44	
Methyl Phenol							1-10	7.5	1-25		1-10		10-50	
o-Alkyl Phenol (1 isomers)					1-10				1-25		100		1-10	
m-Alkyl Phenol					96				1-25				1-10	
Hexanoic Acid							42		10-100		10-100		10-50	
Dimethyl Propanol							10-100				280		10-50	
Phthalic Acid							1-10	8	1-25		100		1-10	
Triphenylmethylmethoxyethylene	745	745	745		75	745	26		36		745		6.4	
Hexane					340		29		160		180		160	
o-Alkyl Benzene					69		6	10	24		609		21	
Acetone							6.0						230	
Trichlorotrifluoroethane													54	
Methyl Ethyl Ketone					330				470				690	
Hexane													27	
Methyl Isobutyl Ketone								840	1100				1630	
Hexanol							78		9.6		745		27	
Dimethyl-1-propanol							745		745				52	
Tetrachloroethane	6.4		12		12		5.7		12		62		745	
Isobutanol									745					
Hexanol									745					
1,1-dichloroethane							745		745				745	
1,1-dichloroethane									745					
Vinyl chloride									745				745	
Dimethyl disulfide														
Methylene Chloride	6.6		7.9		5.3				9.4		7.4		15	
Trimethyl Cyclohexanone					32								13	
Methyl Benzene Methanol													2.5	
Carbonic Acid, Butyl Phenyl Ester													1.2	
Propoxy Butane					38								16	
Di-n-butyl Phthalate	39		7.5		5.6	1-10	10		9.6		7.2		741	
Fluoranthene							4.9		7.2				1-10	
Dimethyl Phenol (1 isomers)													12	
Hexanol Acid													1-10	
Hydroxy Methoxy Benzene					1-10				1-25				1-10	
Pentachloroethanol													4.3	
Naphthalene					1.9	11	741		4.5					
1,1,1-trichloroethane									9.4					
Camphor									230					
o-Alkyl Benzene						1-10	1-10		1-25					
Methyl esters of Ethyl hexanoic Acid									1-25					
Benzene Propanoic Acid									1-25					
Heptanol									14					
Heptanone									220					
Isene									214					
Methyl (methyl ethanol) cyclohexanol									62					
a-Terpinol									400					
Terpinene-4-ol									117					
Isophorone					99		20		9.6					
Quinoline									9.6					
Methyl Naphthalene								1-10	9.6					
Acenaphthene									12					
Dibenzofuran									6.8					
Beta-naphthol									6.8					
Fluorene									22					
Triethyl Ester of Phosphoric Acid									7.2					
Phenanthrene/Anthracene								1-10	9.7					
Butyl Methyl Benzene sulfonamide									17					
Pyrene									2.2					
Methyl Octanone									7.2					
Butoxy Propanol							3.5							
o-Alkyl Styrene					4.7		6.2							
Methyl (hydroxypropyl) ethoxy propanol					24		110							
Butoxy Ethoxy Ethanol							12							
Quinoline							4.9							
Dimethyl Phenol							11							
Tetra methyl Pentanone							1-10							
Diethyl Ether					5.6		6.2							
o-Alkyl Benzene					1.9									
o-Alkyl Phenol					11									
o-Alkyl Styrene					3.5			1-10						
Methyl Heptanone								1-10						
Dimethyl Pentanediol														
Dimethyl Hexane	6.7													
Methyl Propoxy Propanol	4.9													
Hydroxy Propoxy propanol	5.7													
Butoxy Propoxy Methane	3.2													
Methyl Ester of Acetic														
Heptanoic Acid														
Dimethyl Ethyl Benzoic Acid														
Heptanoic Acid														
Heptanol														
1,1,1-Ethanol														
1,1,1,1-Tetrafluoroethane								1-10						
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1,1,1,1-Tetrafluoroethane														
1,1,1,1-Tetrafluoroethane														

WC-001 WC-002 WC-003 WC-004

COMPOUND (ppm)	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT	WATER	SEDIMENT
Benzonic Acid 1/			1-10		1-15			7-15
Methyl Benzoic Acid (3 isomers)	19		1-10		1-15			
o-Alkyl Benzoic Acid			1-10					
m-Alkyl Benzoic Acid	8.7		1-10		1-15			
p-Alkyl Benzoic Acid								
Unidentified compounds 1-10	1.7		12		15		18	
Unidentified compounds 10-100	6.3		6		22		13	
o-Alkyl Benzoic Acid (3 isomers)								
Methyl Benzoic Acid								
Methyl Cyclopentanone								
Methyl Cyclohexanone								
Methyl Cycloheptanone								
Methyl Cyclooctanone								
Methyl Cyclononanone								
Methyl Cyclodecanone								
Methyl Cyclododecanone								
Methyl Cyclopentanol								
Methyl Cyclohexanol								
Methyl Cycloheptanol								
Methyl Cyclooctanol								
Methyl Cyclononanol								
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Methyl Cyclopentanone								
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Methyl Cycloheptanone								
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Methyl Cyclododecanol								
Methyl Cyclopentanone								
Methyl Cyclohexanone								

TABLE 3.
MACROINVERTEBRATES
FROM WILSON CREEK WATERSHED

State of Kentucky (March 19)

Station 01. (2.8 miles below Valley)

Amphipoda

Gammarus sp.

Isopoda

Lirceus sp.

Decapoda

Cambarus sp.

Station 02. (Fairdale Road Bridge Area)

Amphipoda

Gammarus sp.

Isopoda

Lirceus sp.

Decapoda

Cambarus sp.

Mollusca

Gastropoda

Physa sp.

Trichoptera

Limnephilidae

EPA (March 7)

Station 01. (National Turnpike Bridge)

Amphipoda

Gammarus sp.

Isopoda

probably Lirceus sp.

Tipulidae

Tipula sp.

Station 02. (Control Unnamed Tributary
to Wilson Creek)

Amphipoda

probably Gammarus sp.

Isopoda

probably Lirceus sp.

Decapoda

probably Cambarus sp. (juveniles)

Platyhelminthes

Turbellariid flatworms

Mollusca

Gastropoda

Probably Physa sp. (snails)

Ephemeroptera

Unidentified

Trichoptera

Unidentified

DRAFT

EPA
MACROINVERTEBRATE SURVEY
March 7, 1979

<u>STATION</u>	<u>OBSERVATIONS</u>
04 Just downstream from aerator	Isopoda probably <u>Lirceus</u> sp. Amphipoda probably <u>Gammarus</u> sp. Oligochaeta unidentified
05 Just downstream from Golf Course pond outlet upstream from Valley	Isopoda probably <u>Lirceus</u> sp. Decapoda probably <u>Cambarus</u> sp. Amphibia salamander egg masses
06 Riffle-pool area on feeder stream into Wilson Creek	Amphipoda probably <u>Gammarus</u> sp. Isopoda probably <u>Lirceus</u> sp.

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TABLE 5.

[illegible]

* BCF = Bio-concentration Factor

= Log P = Values from ECHOV data base

TABLE 6.

COMPOUND (CAS)	PAINT	SOLVENT	PLASTICS	P'ESTERATIVE	SEDATIVE	ANTICANCER	DYE	ANTILEPTIC	FLUOROS	ANTIDOPANT
Benzic Acid 1/										
Methyl Benzic Acid 1/ (isomers)										
C ₆ Alkyl Benzic Acid										
C ₆ Alkyl Benzic Acid										
Methyl Benzene sulfonamide										
2 Unidentified compounds										
13 Unidentified compounds										
Alkene (2 isomers)		+								
Methyl Pentanol										
Methyl Cyclopentanol										
Dimethyl Pentanone										
Butoxyethanol										
Methyl hydroxy Pentanone										
C ₆ Alkyl Benzene (3 isomers)		+								
Hexachlorane										
Dibutylmethanol (2 isomers)										
Methyl Styrene			+							
C ₆ Alkyl Benzene (5 isomers)										
2,4-Dimethyl Benzene Methanol										
C ₆ Alkyl Styrene										
Hexyl Benzene Methanol		+								
Isophorone 1/										
Phenoxyl Methyl Oxirane										
Methyl Ether			+							
Chlorophenoxypentanol										
Dimethyl Phthalate 2/			+							
Phenoxypentanol		+								
Tetraoxadecane			+							
Diethyl Phthalate 2/										
Methyl Propyl Ester of Benzoic Acid										
Pentoxypentadecane			+							
3,5-Dimethylhexyl Phthalate 2/										
Methyl butanoic Acid					+					
Pentanoic Acid							+			
Phenol 2/		+								
Methyl Phenol			+							
C ₆ Alkyl Phenol (3 isomers)			+							
C ₆ Alkyl Phenol			+							
Methyl hexanoic Acid			+							
Dimethyl Propanol			+							
Phthalic Acid										
1,4-Dichlorobenzene 2/										
Alkene 2/		+								
C ₆ Alkyl Benzene 2/			+							
Acetone		+								
Trichlorotrifluoroethane		+	+							
Methyl Ethyl Ketone 2/	+	+	+							
Hexane		+								
Methyl Isobutyl Ketone 2/	+	+								
Hexanol										
1-Methyl-1-propanol								+		
Tetrachloroethane										
1-Butanol						+	+			
1-Pentanol								+		
1,1-Dichloroethane										
1,1-Dichloroethane										
Vinyl chloride 1/			+							
Dimethyl disulfide										
Methylene Chloride 2/		+								
Trichloro Cyclohexanone										
Methyl Benzene Methanol										
Carbonic Acid, Butyl Phenyl Ester										
Prooxy Butane										
Di-n-butyl Phthalate 1/										
Fluoranthene 2/										
Dimethyl Phenol (3 isomers)								+		
Hexanoic Acid									+	
Hydroxy Methoxy Benzene										
Pentachloropentanol 1/ 2/					+					
Naonchaleine 2/						+	+			
1,1-Trichloroethane										
Camphor 2/	+	+	+	+						
C ₆ Alkyl Benzoic Acid							+			
Methyl esters of Ethyl Hexanoic Acid									+	
Benzene Propanoic Acid										
Heptanol		+								
Heptanone										
Isene						+				
Methyl (methyl ethanol) cyclohexanol										
4-Terpinol						+				
Terpinene-ol							+			
Isophorone 2/		+								
Quinoline				+						
Methyl Anthracene		+								
Acenaphthene 2/			+							
Dibenzofuran										
Beta-naphthyl nitrile										
Fluorene										
Triethyl Ester of Phosphoric Acid										
Phenanthrene/Anthracene 2/										
Butyl Methyl Benzene sulfonamide										
Pyrene 2/										
Methyl Octanone										
Butoxy Propanol			+							
C ₆ Alkyl Styrene			+							
Methyl (hydroxyethoxy) Ethoxy Propanol										
Butoxy Ethoxy Ethanol										
Quinoline										
Dimethyl Phenol										
Hexa methyl Pentanone										
Diethyl Ether		+								
C ₆ Alkyl Benzene										
C ₆ Alkyl Phenol										
C ₆ Alkyl Styrene										
Methyl Heptanone		+								
Triethyl Phthalate										
Triethyl Hexane							+			
Methyl Propanoxy Propanol										
Propanoxy Propanoxy Propanol										
Butoxy Propanoxy Methane										
Methyl ester of Acetyl										
Acetyl 1,2,3										
Methyl Ethyl Benzoic Acid										
Hexanone										
Methoxyethylhexoxy Propanol										
Diethylhexoxy Propanol										
1-Hydroxyhexanone										
Methyl Propanoic Acid			+							
Methyl pentanoic Acid		+	+							
Hexanoic Acid		+								
Heptanoic Acid		+								
Octanoic Acid										
Nonanoic Acid										
Decanoic Acid										
Undecanoic Acid										
Dodecanoic Acid										
Tridecanoic Acid										
Tetradecanoic Acid										
Pentadecanoic Acid										
Hexadecanoic Acid										
Heptadecanoic Acid										
Octadecanoic Acid										
Nonadecanoic Acid										
Eicosanoic Acid										
Docosanoic Acid										
Triacontanoic Acid										
Triheptanoic Acid										

TABLE 7.

COMPOUND (ppb)	HUMAN EFFECTS	CARCINOGEN	TERATOGEN
Benzoic Acid 1/	+		
Methyl Benzoic Acid (3 isomers)	+	+	
C ₆ Alkyl Benzoic Acid	+	+	
C ₆ Alkyl Benzoic Acid	+	+	
Methyl Benzene Sulfonamide	+	+	
2 Unidentified compounds	+	+	
11 Unidentified compounds	+	+	
Xylene (2 isomers)	+	+	
Methyl Pentanol	+	+	
Methyl Cyclopentanol	+	+	
Dimethyl Pentanone	+	+	
Butoxyethanol	+	+	
Methyl Hydroxy Pentanone	+	+	
C ₆ Alkyl Benzene (3 isomers)	+	+	
2,2-Dimethylpentanone	+	+	
Dibutoxyethanol (2 isomers)	+	+	
Methyl Styrene	+	+	+
C ₆ Alkyl Benzene (5 isomers)	+	+	+
4,4-Dimethyl Benzene Methanol	+	+	+
C ₆ Alkyl Styrene	+	+	+
Methyl Benzene Methanol	+	+	+
Isophorone 2/	+	+	+
Phenoxy Methyl Oxirane	+	+	+
Phenyl Ether	+	+	+
Chlorophenoxyethanol	+	+	+
Dimethyl Phthalate 2/	+	+	+
Phenoxypropanediol	+	+	+
Tetraoxadecane	+	+	+
Diethyl Phthalate 2/	+	+	+
Methyl Propyl Ester of Benzoic Acid	+	+	+
Pentaerythritol	+	+	+
Bis (2-ethylhexyl) Phthalate 2/	+	+	+
Methyl Butanoic Acid	+	+	+
Pentanoic Acid	+	+	+
Phenol 2/	+	+	+
Methyl Phenol	+	+	+
C ₆ Alkyl Phenol (3 isomers)	+	+	+
C ₆ Alkyl Phenol	+	+	+
Methyl Hexanoic Acid	+	+	+
Dimethyl Propanol	+	+	+
Phthalic Acid	+	+	+
Trans-1,2-Dichloroethylene 2/	+	+	+
Styrene 1/ 2/	+	+	+
Ethyl Benzene 1/	+	+	+
Decane	+	+	+
Trichlorotrifluoroethane	+	+	+
Methyl Ethyl Ketone 2/	+	+	+
Hexane	+	+	+
Methyl Isobutyl Ketone 2/	+	+	+
2-Hexanol	+	+	+
2-Methyl-1-propanol	+	+	+
Tetrachloroethane	+	+	+
1-Butanol	+	+	+
1-Hexanol	+	+	+
1,1-Dichloroethane	+	+	+
2,2,4,4-Tetrachlorobutane	+	+	+
Vinyl chloride 1/	+	+	+
Dimethyl disulfide	+	+	+
Methylene Chloride 2/	+	+	+
Trimethyl Cyclohexanone	+	+	+
Methyl Benzene Methanol	+	+	+
Carbonic Acid, Butyl Phenyl Ester	+	+	+
Propoxy Butane	+	+	+
Di-n-butyl Phthalate 1/	+	+	+
Fluoranthene 2/	+	+	+
Dimethyl Phenol (3 isomers)	+	+	+
Hexanol Acid	+	+	+
Hydroxy Methoxy Benzene	+	+	+
Pentachloronitrobenzene 1/ 2/	+	+	+
Naphthalene 2/	+	+	+
1,1,1-Trichloroethane	+	+	+
Camphor 2/	+	+	+
C ₆ Alkyl Benzoic Acid	+	+	+
Methyl esters of Ethyl Hexanoic Acid	+	+	+
Benzene Propanoic Acid	+	+	+
Heptanol	+	+	+
Heptanone	+	+	+
Isone	+	+	+
Methyl (methyl ethanol) cyclohexanol	+	+	+
α-Terpinol	+	+	+
Terpinene-4-ol	+	+	+
Quinoline	+	+	+
Methyl Naphthalene	+	+	+
Acenaphthene 2/	+	+	+
Urethorutan	+	+	+
Beta-naphthol	+	+	+
Fluorene	+	+	+
Tributyl Ester of Phosphoric Acid	+	+	+
Phenanthrene/Anthracene 2/	+	+	+
Butyl Methyl Benzene Sulfonamide	+	+	+
Pyrene 2/	+	+	+
Methyl Octanone	+	+	+
Butoxy Propanol	+	+	+
C ₆ Alkyl Styrene	+	+	+
Methyl (propoxyloxy) ethoxy Propanol	+	+	+
Butoxy Ethoxy Ethanol	+	+	+
Dimethyl Phenol	+	+	+
Tetra methyl Pentanone	+	+	+
Dibutyl Ether	+	+	+
C ₆ Alkyl Benzene	+	+	+
C ₆ Alkyl Phenol	+	+	+
C ₆ Alkyl Styrene	+	+	+
Methyl Heptanone	+	+	+
Trimethyl Pentandiol	+	+	+
Trimethyl hexane	+	+	+
Methyl Propoxy Propanol	+	+	+
Hydroxy Propoxy Propanol	+	+	+
Butoxy Propoxy Methane	+	+	+
Methyl ester of Acetyl	+	+	+
Hexanoic Acid	+	+	+
Dimethyl Ethyl Benzoic Acid	+	+	+
Hexanone	+	+	+
Methoxymethylmethoxy Propanol	+	+	+
Dibutyl Propanol	+	+	+
2-Hydroxyindene	+	+	+
Methyl Propanoic Acid	+	+	+
Methyl Pentanoic Acid	+	+	+
Butanoic Acid	+	+	+
1-Propanol	+	+	+
Methyl alcohol	+	+	+
2-Hydroxybutanone	+	+	+
Methoxymethyl Benzene	+	+	+
2-Hydroxyethanol 2/	+	+	+
2-Hydroxy-1-propanol	+	+	+
2-Hydroxy-2-propanol	+	+	+
2-Hydroxy-3-pentanone	+	+	+
2-Hydroxy-4-pentanone	+	+	+
2-Hydroxy-5-pentanone	+	+	+
2-Hydroxy-6-pentanone	+	+	+
2-Hydroxy-7-pentanone	+	+	+
2-Hydroxy-8-pentanone	+	+	+
2-Hydroxy-9-pentanone	+	+	+
2-Hydroxy-10-pentanone	+	+	+
2-Hydroxy-11-pentanone	+	+	+
2-Hydroxy-12-pentanone	+	+	+
2-Hydroxy-13-pentanone	+	+	+
2-Hydroxy-14-pentanone	+	+	+
2-Hydroxy-15-pentanone	+	+	+
2-Hydroxy-16-pentanone	+	+	+
2-Hydroxy-17-pentanone	+	+	+
2-Hydroxy-18-pentanone	+	+	+
2-Hydroxy-19-pentanone	+	+	+
2-Hydroxy-20-pentanone	+	+	+
2-Hydroxy-21-pentanone	+	+	+
2-Hydroxy-22-pentanone	+	+	+
2-Hydroxy-23-pentanone	+	+	+
2-Hydroxy-24-pentanone	+	+	+
2-Hydroxy-25-pentanone	+	+	+
2-Hydroxy-26-pentanone	+	+	+
2-Hydroxy-27-pentanone	+	+	+
2-Hydroxy-28-pentanone	+	+	+
2-Hydroxy-29-pentanone	+	+	+
2-Hydroxy-30-pentanone	+	+	+
2-Hydroxy-31-pentanone	+	+	+
2-Hydroxy-32-pentanone	+	+	+
2-Hydroxy-33-pentanone	+	+	+
2-Hydroxy-34-pentanone	+	+	+
2-Hydroxy-35-pentanone	+	+	+
2-Hydroxy-36-pentanone	+	+	+
2-Hydroxy-37-pentanone	+	+	+
2-Hydroxy-38-pentanone	+	+	+
2-Hydroxy-39-pentanone	+	+	+
2-Hydroxy-40-pentanone	+	+	+
2-Hydroxy-41-pentanone	+	+	+
2-Hydroxy-42-pentanone	+	+	+
2-Hydroxy-43-pentanone	+	+	+
2-Hydroxy-44-pentanone	+	+	+
2-Hydroxy-45-pentanone	+	+	+
2-Hydroxy-46-pentanone	+	+	+
2-Hydroxy-47-pentanone	+	+	+
2-Hydroxy-48-pentanone	+	+	+
2-Hydroxy-49-pentanone	+	+	+
2-Hydroxy-50-pentanone	+	+	+
2-Hydroxy-51-pentanone	+	+	+
2-Hydroxy-52-pentanone	+	+	+
2-Hydroxy-53-pentanone	+	+	+
2-Hydroxy-54-pentanone	+	+	+
2-Hydroxy-55-pentanone	+	+	+
2-Hydroxy-56-pentanone	+	+	+
2-Hydroxy-57-pentanone	+	+	+
2-Hydroxy-58-pentanone	+	+	+
2-Hydroxy-59-pentanone	+	+	+
2-Hydroxy-60-pentanone	+	+	+
2-Hydroxy-61-pentanone	+	+	+
2-Hydroxy-62-pentanone	+	+	+
2-Hydroxy-63-pentanone	+	+	+
2-Hydroxy-64-pentanone	+	+	+
2-Hydroxy-65-pentanone	+	+	+
2-Hydroxy-66-pentanone	+	+	+
2-Hydroxy-67-pentanone	+	+	+
2-Hydroxy-68-pentanone	+	+	+
2-Hydroxy-69-pentanone	+	+	+
2-Hydroxy-70-pentanone	+	+	+
2-Hydroxy-71-pentanone	+	+	+
2-Hydroxy-72-pentanone	+	+	+
2-Hydroxy-73-pentanone	+	+	+
2-Hydroxy-74-pentanone	+	+	+
2-Hydroxy-75-pentanone	+	+	+
2-Hydroxy-76-pentanone	+	+	+
2-Hydroxy-77-pentanone	+	+	+
2-Hydroxy-78-pentanone	+	+	+
2-Hydroxy-79-pentanone	+	+	+
2-Hydroxy-80-pentanone	+	+	+
2-Hydroxy-81-pentanone	+	+	+
2-Hydroxy-82-pentanone	+	+	+
2-Hydroxy-83-pentanone	+	+	+
2-Hydroxy-84-pentanone	+	+	+
2-Hydroxy-85-pentanone	+	+	+
2-Hydroxy-86-pentanone	+	+	+
2-Hydroxy-87-pentanone	+	+	+
2-Hydroxy-88-pentanone	+	+	+
2-Hydroxy-89-pentanone	+	+	+
2-Hydroxy-90-pentanone	+	+	+
2-Hydroxy-91-pentanone	+	+	+
2-Hydroxy-92-pentanone	+	+	+
2-Hydroxy-93-pentanone	+	+	+
2-Hydroxy-94-pentanone	+	+	+
2-Hydroxy-95-pentanone	+	+	+
2-Hydroxy-96-pentanone	+	+	+
2-Hydroxy-97-pentanone	+	+	+
2-Hydroxy-98-pentanone	+	+	+
2-Hydroxy-99-pentanone	+	+	+
2-Hydroxy-100-pentanone	+	+	+

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